



Holloman Air Force Base, New Mexico



Design
Compatibility
Standards

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Air Force
Base,
New Mexico



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Compatibility
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1. EXECUTIVE SUMMARY

Holloman Air Force Base, without the benefit of a "formal" comprehensive design guideline, has in it's recent development, established the beginnings of a consistant basewide aesthetic character. An obvious awareness of planning and aesthetic issues as basewide, rather than *only* building specific, has resulted in new construction that can serve as a design benchmark for future development on the base.

Based on observations of the unique physical environment at Holloman, both natural and built, the standards outlined in this document recognize and further refine the positive characteristics existing on the base and define new approaches that reinforce these positives. They will provide to the base, and to design professionals working with the base, a set of "rules" resulting in a more coordinated and consistant visual and functional character in future base planning and construction. These standards do not limit in any way the functional or aesthetic creativity of any design professional chosen to work at Holloman. Creative, innovative and appropriate solutions to design problems are in fact the minimum expectation.

Holloman has initiated efforts aimed primarily at comprehensive planning of future base facilities and needs. The "Horizons 2000" Facility improvement Plan and the current Holloman Air Force Base General Plan deal with these broad-scope issues. The Military Family Housing Community Plan deals in a more focused area and touches on aesthetic and design issues within the family housing zone. These new Design Compatibility Standards should be used in conjunction with, and complement the intent of existing, active planning documents.

All tenant units at Holloman Air Force Base are required to conform with the architectural, landscape, exterior signage and engineering sections of this document.

Any deviations from the guidelines listed in this document must be approved by the Base Civil Engineer and Engineering Flight.



2. BASE MISSION

2.A History

Holloman Air Force Base, originally established as Alamogordo Army Air Field, began construction in 1942 as a temporary wartime base. Primarily serving as a training base for bomber pilots and crews, Holloman is most well known during this period for the detonation, at the Trinity Site, of the first atomic bomb developed under the Manhattan Project. Following a brief deactivation after World War II the base entered a period lasting into the late 1960's of focus on research and development, primarily, beginning with pilotless aircraft, guided missiles and allied equipment. Renamed Holloman AFB in 1948 the base continued in its function of guided missile and space research and development until 1968, when the 49th Tactical Fighter Wing was assigned to the installation. Soon after, the Tactical Air Command assumed command of the base. Upon deactivation of the TAC in 1992 command was transferred to the Air Combat Command, Holloman's current command. The 49th Fighter Wing, Holloman's current host unit, was born in 1991 with the reorganization of the 833rd Air Division. Holloman is currently home to F-117A stealth fighters. In addition to training American fighter pilots the 49th also trains German and Taiwanese air crews using the F-4E Phantom and AT-38B. By 1999 implementation of Holloman Phase I and II will locate 42 German Air Force Tornados and associated personnel to Holloman.

2.B Base Components

The 49th Fighter Wing, based at Holloman, is composed of the 49th Operations Group, the 49th Support Group, the 49th Logistics Group, the 49th Medical Group, and the 49th Materiel Maintenance Group.

2.C Mission Statement

The primary mission of the 49th Fighter Wing is to develop and maintain operational capability to conduct strategic warfare as an Air Combat Command (ACC) base and to provide unsurpassed combat support forces to meet any worldwide contingency, academic ground and flying training for its people and selected foreign crews, and quality support for all base personnel associate units and the local community.

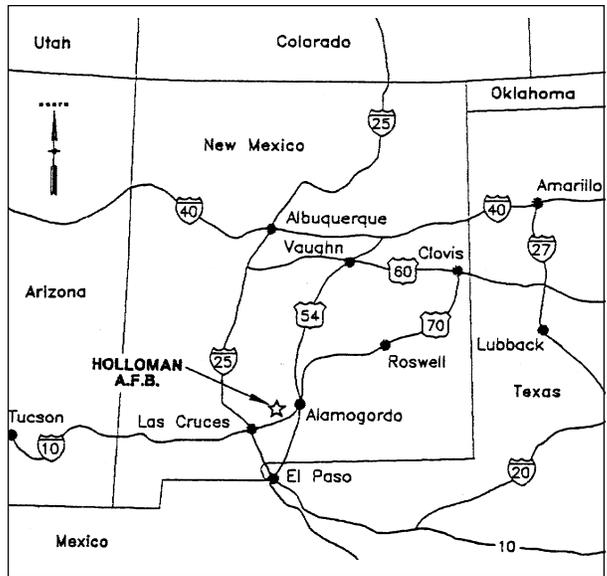
3. REGIONAL SETTING

3.A Geographic Setting

Holloman Air Force Base is located seven miles west of the city of Alamogordo in south-central New Mexico. About 85 miles north-northeast of El Paso, Texas, Holloman is located within the Tularosa Basin between the Sacramento and San Andreas mountain ranges. The base is easily accessible via State routes 70 and 54.

3.B Climatic Setting

The climate at Holloman AFB is significantly influenced by its location between mountain ranges. Basically “high desert” (about 4000 feet above sea level), average precipitation as recorded at the base weather station is 8.3 inches annually with an average humidity of only 48%. The average annual



temperature is 61 degrees with seasonal mean temperatures of 42 degrees in January and 80 degrees in July. Daily temperature fluctuations average about 30 degrees. Strong southerly wind flow, sometimes reaching 65 miles per hour, with periods of blowing dust and sand characterize the March through May period.

The area averages more than 300 days of sunshine per year. Sun angles range from approximately 81 degrees in summer to 33 degrees in winter. Because of the high summer temperature range, the lack of natural shade and the high percentage of sunny days, solar design and control should be addressed on all Holloman design projects.

3.C Geological Setting

The visible natural site character is what might be expected - harsh, flat desert terrain bounded by dramatic mountains. The most dramatic natural feature is the expanse of white gypsum sand dunes found within the White Sands Missile Range and White Sands National Monument. These dunes cover much of the western edge of the base. This gypsum is highly corrosive to ferrous metals, toxic to many plant species and tends to dissolve when exposed to water. The immediate proximity to the gypsum concentration creates high gypsum content soil conditions over much of the facility. As a consequence, indigenous desert flora is noticeably less apparent on the base than it is as close as nearby Alamogordo. Much of the higher profile landscaping on the base grows in imported soil. Gypsum content in the soil does, and will continue to, heavily impact the overall approach to base landscaping, stormwater management and the selection of construction materials.

The conditions outlined above describe a location with

unusually harsh design conditions in terms of both climate and geology. Site-specific design is mandatory. It is the imperative that each design professional working in this environment recognize and respond to the specific conditions that exist at Holloman AFB.



Part II -
Architectural
Standards



1. ZONING

Holloman AFB is currently segregated into three functional zones.

1.A Zone 1 - Mission

Includes areas directly related to the operation and maintenance of aircraft (hangars, runways, etc.) and the training of their crews. Also includes areas for maintenance, storage and supply functions not directly related to aircraft. Facilities This zone includes all areas roughly north of the center of Delaware Avenue.

1.B Zone 2 - Mission Support

Includes areas designated for commercial activities, club facilities, indoor recreation and community services. Also includes areas designated for administrative services and those designated for unaccompanied housing. This zone occupies the central portion of the base, roughly between Delaware and Arizona Avenues.

1.C Zone 3 - Family Housing

Includes areas designated for accompanied and unaccompanied "single family" style housing typically in a neighborhood setting. This zone occupies the extreme southeastern portion of the base.

Structures may exist in a zone that do not fit the functional description of the zone. Administrative support structures, serving specific hangar buildings, are located in the Mission zone. Dormitories are located in the Mission Support zone. Although these buildings may violate the functional character of a zone care should be taken to assure visual compatibility

between these building and their neighboring structures.

Various base-wide aesthetic treatments have been successfully established that address all zones. These characteristics help create a harmonious, consistent image for the entire base. Continuation of these existing positive characteristics in future design will further reinforce the image of the base as a cohesive whole. Functional requirements may, however, dictate conflicting requirements between different zones of the base. This is inevitable in an environment as functionally diverse as Holloman AFB. By recognizing these differences and grouping facilities with similar missions and functional requirements together, some functional and aesthetic logic can be realized within the diversity. Both the base-wide aesthetic standards and the zone-specific standards are outlined in the following pages.



2. ACC ARCHITECTURAL STANDARDS SYNOPSIS

2.A Policy Statement

“The special character of defense installations dictates compatibility over personal style. The limited size and function of Air Combat Command (ACC) bases cannot accept the diverse opinions of the many design professionals without becoming cluttered and unsettled. In this context “good design” is defined as design that contributes to the overall harmony of the base rather than design that attracts individual attention. Good examples of where ACC design goals should lead are college campuses and corporate office parks. Because we do not want monotony, every building does not need to be the same, but some common architectural element or theme should tie all buildings together. Responsible design will achieve this goal.

Use a simple approach to locate facilities. Facilities having similar functions should be located in the same vicinity on uncongested sites, but do not permit parking to dominate. Use indigenous, low maintenance landscape material. Relate building forms to each other and use low maintenance materials. Do not paint new buildings. Use materials that do not require painting during their lifecycle. Use neutral colors such as grey and brown.”

2.B Goals

The following goals have guided the above ACC policy and should also guide all levels of design at Holloman:

- *Site Conditions* - Provide site conditions and building forms appropriate to any new, future or existing buildings.
- *Low Maintenance* - Use permanent low maintenance exteriors that are compatible with ACC bases and their natural and manmade environments.
- *Environmental* - Design facilities in ways to enhance environmental quality and minimize consumption of natural resources.
- *Layouts* - Provide functional layouts that completely satisfy user needs.
- *Cost* - Reduce lifecycle costs.
- *Labor* - Reduce labor intensive maintenance procedures.
- *Approval* - Obtain user approval of design concept layout prior to predesign conferences in order to prevent costly changes during final design, contracting and construction. This is normally done through a Customer Concept Document prior to preparation of programming documents.

While the guidelines presented in the following pages are specific to Holloman Air Force Base, the overall design philosophy of the ACC, stated above, is the foundation upon which these specific recommendations are based.

3. BUILDING SCALE / HEIGHT / MASSING

3.A Current Conditions

As might be expected, building scale and massing vary greatly at Holloman depending on building function and zone.

In Zone 1, hangars and maintenance buildings are required to provide large open work bays and accomodate equipment. Large-scale warehouse buildings are in many cases accompanied by one or two story administrative support structures. Zone 1 exhibits the fewest consistencies in scale and massing due to the purely utilitarian nature of the zone.

Zone 2 structures tend to be one or two stories, with some three story structures. Generally compact in plan

and rectangular in shape, these buildings reflect their administrative, community support and dormitory functions.

Zone 3, the Military and Family Housing areas at Holloman, consists exclusively of one and two story structures, residential in both character and scale. Massing and scale-wise this is the most consistent zone on the base.

Zone 2, though lacking the overall consistency in scale and massing of Zone 3, does have individual pockets that positively respond to these issues. The dormitory area between Rhode Island and Delaware Avenues concentrates similarly sized and scaled buildings, creating a cohesive architectural grouping. Likewise the Youth Center (Building 647) and Child Development Center (Building 650) are complementary in scale and massing.



Youth Center and Child Development Center

3.B General Recommendations

- Building heights at Holloman should be reviewed on a case by case basis. Specific program needs may define or restrict the number of stories. In general buildings should be one or two stories in height.
- Building massing should generally be simple and economical. Avoid uneconomical shapes such as curves, diagonals and long rectangles unless specifically warranted by site or building function. If functionally appropriate the clustering of buildings and building masses can soften the harsh climatic conditions by providing wind breaks and shade on exposed facades.
- Setback distance on primary and secondary streets should vary no more than 10 percent from the average setback of existing surrounding buildings.

- If programmatically justified, consider interior courtyards or clustered building arrangements to create naturally protected exterior courtyard spaces. For additional information see "Courtyards/Shelters" in LandscapeStandards, Section 13.
- Site buildings supporting a common function (such as dormitories) in proximity to each other. In addition to sharing common infrastructure, the massing, scale, materials and details can be used to link the buildings aesthetically.
- Residential structures in Zone 3 should be limited to two stories in height. Setback distance from the street should be consistent within individual housing groups.



Helicopter Rescue Recovery Hangar and Squadron Operations buildings - Different scales but compatible design

3.C Variations

As mentioned, due to the utilitarian nature of the structures in Zone 1, compatibility with adjacent structures is problematic. Structures of conflicting scales should be visually connected by design elements such as similar masonry base treatment, banding, coloration, etc. The Helicopter Rescue Recovery Hangar, Building #578, and the Squadron Operations Building, #577, are architecturally compatible, despite scale differences, through the use of common base treatments, materials, detailing and roof slope.

4. ROOFS

4.A Current Conditions

Roof forms and materials vary widely at Holloman. Flat roofs, both built-up and membrane, occur base-wide. Curved and low-slope metal roofs, some standing seam, some with prefabricated panels, can be seen on hangars and service buildings. Higher-sloped standing seam metal roofs occur base-wide. Sloped roofs appear in shades of brown, tan and white. Typically, housing is roofed with low-sloped gravel or fiberglass shingles.

The most positive trends on the base and perhaps the most unifying are the use of sloped, brown standing seam metal roofing on buildings in zones 1 and 2; and the use of fiberglass shingles on the sloped roofs of the housing units. While flat roofs are well



A Successful example of a sloped standing seam metal roof with a pronounced overhang

represented, the buildings using sloped roofs provide the beginning of a stronger overall “base character”. Base policy encourages the use of sloped roof materials and forms.

4.B General Recommendations

- Roofs at Holloman should be of gable or hipped design, sloped a minimum of 3:12 and be of prefinished standing seam metal or fiberglass shingles. 1-1/2:12 slope is allowable on very long span metal roofs. If building scale and economy dictate low slope or flat roofs on a building, designers are encouraged to use strategically placed sloped roof elements to punctuate key building points (entrances for example) and to screen portions of the flat roof where possible. Any low slope or flat roof must be approved by the Base Architect.
- Roof overhangs and trellis elements are encouraged for sun control. Solar gain can be cut substantially, especially at windows. Pronounced fascias are also encouraged, particularly on metal roofs. Both the fascia and soffit should be of the same material as the roofing. Carefully proportioned fascias can positively affect scale and massing, particularly in larger buildings.
- Vents, piping, and equipment forced to penetrate a roof shall be treated as trim material and painted to match the roof. If possible such elements should be located on rear sides or areas out of view.
- Due to local soil conditions, water control is critical. Gutters, preferably concealed, are mandatory on all sloped-roof buildings to control stormwater runoff. Internal roof drains are discouraged. Downspout placement, as with any other architectural element, should be carefully considered and well integrated

with the overall design. Collected water should be channelled a *minimum* of 10' from the building perimeter to the base stormwater drainage system.

- All fascia, gutter and roof trim shall be made of prefinished metal and be designed to prevent oil-canning deformation from expansion and contraction.
- Equipment shall in no case be located on sloped roofs. If rooftop equipment is required on flat roofs it should be located on rear sides or areas out of view to minimize visibility.



Downspout well integrated with facade. Runoff channels into a catch basin.

4.C Approved Materials and Treatments

Zone 1

Standing seam metal roofing only. All roofs should be minimum 3:12 slope.

Manufacturer: Metal Building Components, Inc.
Color: Sahara Tan

Zone 2

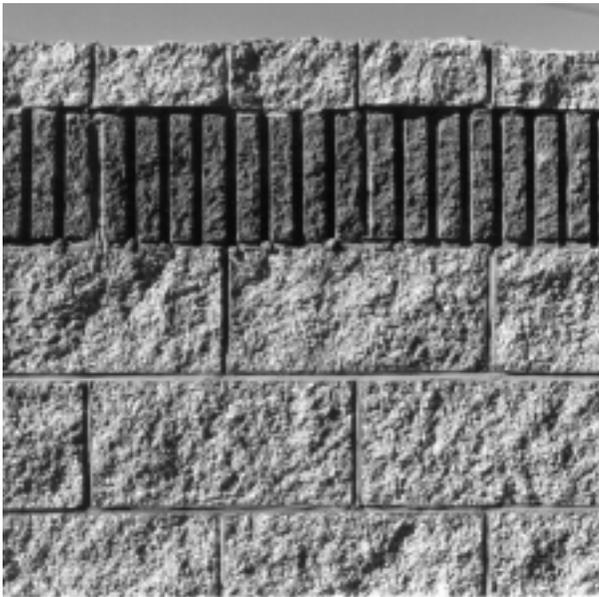
Standing seam metal roofing only. All roofs minimum 3:12 slope.

Manufacturer: Lilly Industries, Inc.
Color: Medium Bronze

Zone 3

Fiberglass shingles only. All roofs min. 3:12 slope.

Manufacturer: Owens Corning, AEP
Color: Autumn Brown, Desert Tan



Two-color split faced and ribbed concrete block combination

5. EXTERIOR WALLS

5.A Current Conditions

A wide variety of exterior wall types currently exist at Holloman AFB. In zones 1 and 2 various masonry treatments are common. Brick, split face and ribbed concrete-masonry-unit (CMU), painted CMU, aggregate panels and limited precast concrete are all present. In addition to masonry, in Zone 1, various metal wall systems are present. In Zone 3, brick, painted CMU, stucco and even wood siding are used as exterior wall finishes. The majority of walls in all zones are various shades of brown and tan.

The most positive exterior wall treatment in zones 1 and 2 is the split-face and ribbed CMU evident in various combinations in many newer buildings. The Helicopter Rescue Recovery Hangar Building #578 and Squadron Operations Building #577 are excellent examples of a mix of acceptable exterior wall finishes. The hangar building combines approved metal panels on higher wall surfaces with split face CMU on lower walls to compliment the adjacent administrative support building, also of split face CMU. The Dining Hall, Building #812, also represents a successful application of split face CMU. Zone 3 exhibits a mix of exterior finishes and would benefit greatly from a cohesive exterior wall finish palette.

5.B General Recommendations

- Masonry walls should be built of integrally colored split-face or ribbed CMU. All CMU should be manufactured with additives to discourage efflorescence. Likewise all mortar should contain similar admixtures. CMU variations within a single building should be limited to a split face primary block with one type and color of complimentary

accent block. Articulation of walls should occur through changes in the wall plane and variations in texture and color within the block palette, not through the use of paint or material change. Masonry articulation can also successfully aid in identifying building entry in appropriate situations.

- Exposed aggregate or precast concrete panels are also acceptable. These are limited primarily to renovation applications and require approval from Base Architect and ACC Command Architect.
- If, in larger scale structures such as hangars and industrial buildings, function and budget dictate the use of preengineered metal buildings a masonry “base” should be used. The base should match the color, material and height of any adjacent administrative or support buildings. Metal wall panels can be used above this and should match the metal roof of the structure. Metal wall panels, when used, should be factory prefinished aluminum or galvanized steel with a 20 year guarantee against fading. Use of metal siding requires review and approval by the Base Architect and ACC Command Architect.
- When upgrading existing CMU or frame structures, stucco, exterior insulation and finish systems (EIFS) and limited exposed aggregate panels are acceptable options. In these instances a waiver is required from the Base Architect and ACC Command Architect.
- New construction in Zone 3 shall incorporate stucco as the primary exterior wall finish. Synthetic stucco (EIFS systems) may be used for renovation in Zone 3 but require review and approval by Base Architect and ACC Command Architect.

5.C Unacceptable Applications

New buildings should not require exterior painting. Standard CMU, stucco, metal siding, exterior insulation and finish systems, etc. that are normally restored by painting are not to be used in zones 1 and 2. Extraneous wall attachments such as downspouts, conduit, switches, bells, etc. should not be emphasized by painting. These should be painted or factory finished to match wall color.

5.D Approved Materials and Treatments

Zones 1 & 2

Split Face/Ribbed CMU

Manufacturer: Crego Block

Colors: Mountain Red, Holloman Brown



Renovated Dormitory with exposed aggregate horizontal bands. Note the sloped roof which punctuates the entry point.

Metal Wall Panels (Extremely Large Buildings)
Manufacturer: Metal Building Components, Inc.
Colors: Sahara Tan, Koko Brown

Exterior Insulation and Finish System (Renovation only)
Manufacturer and color: As selected by Base Civil Engineering.

Painted Exterior Doors
Paint Color: Koko Brown

Painted Wallsurfaces
Paint Color: As approved by base Civil Engineering.

Zone 3

Stucco
Manufacturer and color: As selected by Base Civil Engineering.

Exterior Insulation and Finish System (Renovation only)
Manufacturer and color: As selected by Base Civil Engineering.

Painted Wall Surfaces
Manufacturer: Welborne
Colors: Q5-6P, Q6-46P, Q5-11P, Q4-37P

Painted Doors, Louvers, Trim
Color: As approved by base Civil Engineering.



Inappropriate use of metal siding

6. WINDOWS

6.A Current Conditions

As with roof and exterior wall materials, window types vary greatly over Holloman AFB. In Zones 1 and 2 large steel framed industrial style windows may be found on some of the hangar and maintenance structures. Immediately adjacent may be administrative structures with insulated fixed glass units in punched masonry openings. Operable windows; horizontal sliders, single hung, etc., are found in the Zone 1 residential structures.

Both building age and function have contributed to the window variation at Holloman. Current base policy has created a trend toward double glazed, thermally broken metal framed units, generally dark bronze anodized. Recessed window planes are frequent due to the harsh solar conditions. In Zone 3 the windows are predominantly operable dark brown or bronze metal framed units.

6.B General Recommendations

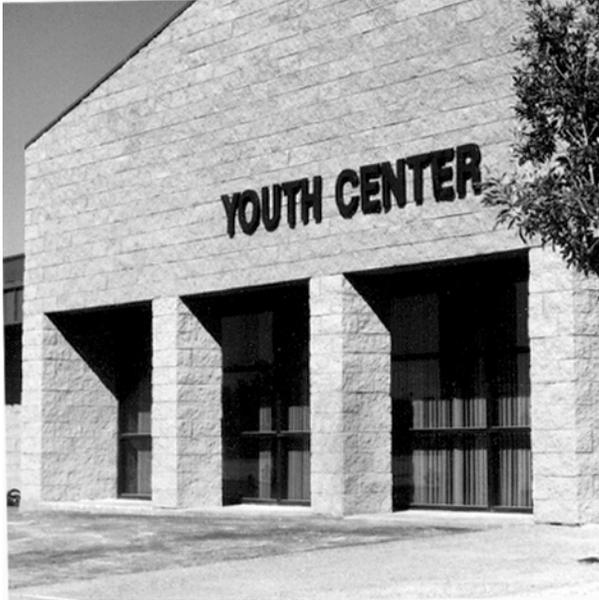
- Windows at Holloman should have bronze tinted double glazing set in thermally broken, anodized aluminum frames. Triple glazing, for sound control, should be used on walls along the flight line and in AICUZ (air installation compatible use zone) areas. Toilet windows should be frosted glass.
- The Base is flexible regarding the amount of glazing used on a building. Limited glass area in a punched opening vocabulary is encouraged base-wide. Where appropriate limited window groupings, glazed entry doors with sidelights and other variations are acceptable. Large curtain wall applications however are not acceptable in Holloman's harsh climate.

Limited operable windows are desirable in Zones 1 & 2. Operable windows are desirable in Zone 3.

- When possible windows should be recessed for solar control. Solar control is mandatory on *all* south and west facing windows. If window blinds are used they should not be of reflective metal. Clerestory windows, when functionally justified, are acceptable.
- Clerestory windows should be oriented to minimize heat gain. Skylight applications are not desirable and require a waiver from the Base Architect and ACC Command Architect.
- Replacement windows should match the size of the window being replaced. Unless otherwise justified replacement windows should adhere to the above recommendations for new windows. Any variation will require a waiver from the base Architect and Civil Engineer.



Recessed storefront entry glazing



Recessed storefront system (top) and Windows (bottom) at Youth Center

- Main entry doors in Zones 1 and 2 should be glazed storefront in approved colors. Secondary entry and exit doors and frames shall be painted metal. Exterior doors in Zone 3 shall be painted insulated metal.

6.C Unacceptable Applications

Window design and selection should consider function and maintenance. Window materials that require painting or other frequent maintenance are not acceptable. Flush window application on facades subject to harsh sun are to be avoided. Solar shading film is an unacceptable solar control option.

6.D Approved Materials and Treatments

Zone 1

Hangar Doors:

Manufacturer: Metal Building Components, Inc.

Colors: Sahara Tan

Exterior Painted Doors:

Colors: Koko Brown, Medium Bronze

Windows/Glazing:

Manufacturer: Kawneer Co., Inc.

Colors: Frame : Bronze

Glazing: Bronze, triple glazed

Zone 2

Exterior Painted Doors:

Colors: Koko Brown, Medium Bronze

Windows/Glazing/Storefront Systems:

Manufacturer: Kawneer Co., Inc.

Colors: Frame : Bronze

Glazing: Bronze, double glazed

Zone 3

Exterior Painted Doors:

Colors: As approved by base Civil Engineering.

Windows/Glazing:

Manufacturer: As approved by base Civil Engineering.

Colors: #40 bronze

7. SITE WALLS AND FENCES

7.A Current Conditions

Site walls and fences of various types are used extensively at Holloman. Functionally these fences and walls serve as property and security boundaries, visual screens and wind breaks. Materials include split face and ribbed CMU in various combinations, PVC, chain link and basketweave wood fences.

Within Zones 1 and 2 some consistency exists due to the use of split face and ribbed CMU for the majority of the site walls and fences. This material and the horizontal emphasis of the fences and walls blends well with the character of the desert and reflects the material palette of much of the architecture. This adds to the base the type of visual harmony sought in overall ACC design policy. Within Zone 3 however, the chaotic mix of chain link, basketweave cedar, and concrete block



Typical Masonry site/screen wall

does not support a cohesive visual character. The current fence replacement policy was implemented as a major first step in eliminating the problem and elevating the visual character of the zone.

7.B General Recommendations

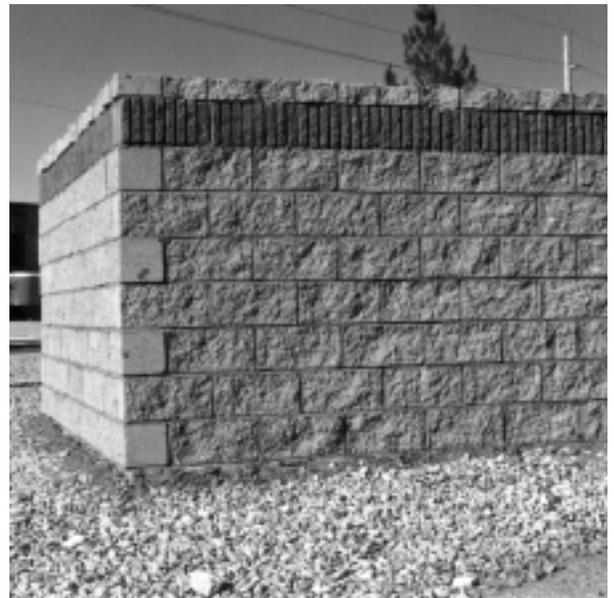
- Fences and site walls should continue to be used at Holloman as boundary elements, visual screens and wind breaks. In Zones 1 and 2, wall and fences should be constructed of split-faced block, in a maximum of two colors, with a solid cap course top. When used in conjunction with a new building, the material and design should match the building.
- Any decoration on site walls and fences should be achieved through variations in the wall plane and the use of perforated block or open voids in the block coursing at selected locations. Undulation and height

variation is encouraged for stability and for the creation and definition of green spaces where appropriate. The horizontal emphasis should remain the prominent image.

- In Zone 3, fences and site walls at main boundary areas (street edges, project boundaries, etc.) should follow the above recommendations. Fences separating individual yards should be base-standard white PVC. Should the need exist to fully enclose a rear yard, base-standard chain link fencing supplied by the tenant is allowed.
- Provide three-sided CMU enclosures for all dumpsters. Enclosures shall be designed following masonry site wall guidelines. Orient open end of enclosure away from building entrances and primary views and include a concrete apron. In Zone 3, dumpsters should be located away from front yards.



Standard PVC Fencing in Zone 3



Typical Dumpster enclosure

Fences, site walls, dumpsters, etc. shall be located a minimum of 20 feet from any road to ensure that the visual line of sight for motorists is not obstructed.

7.C Approved Materials and Treatments

All Zones

Split Face/Ribbed Concrete Masonry Units

Manufacturer: Crego Block

Colors: Mountain Red, Holloman Brown

Zone 3

PVC Fencing:

Contact Base Civil Engineering for product information.

Chain link:

Contact Base Civil Engineering for product information.



Part III -
Interior
Design
Standards



1. ACC INTERIOR DESIGN POLICY

ACC interior design standards are developed around an understanding of the elements and principles of design and of how the industry works, not around personal likes and dislikes.

2. INTERIOR DESIGN STANDARDS

ACC standards differentiate based on whether a finish will be permanent or non-permanent. The differentiation is necessary due to color palette changes each year.

2.A Permanent Finishes

Permanent finishes are generally the hard surface structural interior design (SID) finishes that will last 15 to 20 years and whose removal and re-installation is a major disruption to the facility. Such items as vinyl composition tile (VCT), ceramic and other surface tile, plastic laminates, toilet partitions, lockers, window blinds, all modular or systems furniture panels, work surfaces, flipper doors, etc. are considered permanent finishes. Generally permanent finishes need to be a color that will not become dated in a few years. Command standards require that all permanent finishes be either brown-tone or grey-toned neutrals. These neutral shades can vary from very light (such as an off-white relating to the particular color tone) to a mid-range neutral of this same shade.

2.B Non-Permanent Finishes

Carpet, paint, vinyl wallcovering, upholstery, artwork, etc. are considered non-permanent finishes. Non-permanent finishes will last from five to seven years under most conditions. Command standards allow non-permanent finishes to be any coloration

appropriate to the facility. Most often these finishes will be in mid-range colorations. Very seldom would there be a use for pastel or very bright colors in facilities. However, primary colors of red, yellow, blue and green may be used in youth centers, child care centers and bowling centers.

While non-permanent finishes are allowed in various colors, in office and other work areas it is highly recommended that the vinyl wallcovering or other painted wall surfaces be kept in neutral coloration. In other words, develop a neutral shell for the interior space with only the carpet, upholstery and artwork providing the color accent.

2.C General Recommendations for Finishes and Treatments

- *Vinyl Wallcovering* - Should be type II in most applications. Type I has limited use in most ACC facilities. A vertical texture will help hide seaming.
- *Paint* - Use a low sheen enamel for all painted surfaces.
- *Laminates* - Laminate surfaces are much more maintainable if the laminate has a flecked, speckled, mottled or granite look. Soiling or water spotting is not nearly so visible on these surfaces.
- *Ceilings* - In almost all facilities ceilings (whether painted gypsum board or acoustical ceiling tile) are to be off-white to coordinate with the color tone of the walls. Textured ceiling tiles in a two foot square with a tegular edge are recommended.
- *Wainscot and Chair Rail* - Wainscot is not recommended in most areas. Dark paneled wainscot has the visual effect of reducing the size of small

office spaces. In long hallways wood panel wainscot has a railroading effect. A type II heavy duty vinyl wall covering will have a better effect. If paneling is required, cover one accent wall floor to ceiling. The purpose of chair railing is to protect wall surfaces from being marred by chair backs. Therefore, the chair back height must be considered to properly locate the chair rail. It may be stained or painted to coordinate with other woodwork or doors. Wainscot and chair rail should be no more than 42" high in corridors. Heavy vinyl bumper guards may also be used to protect walls in corridors where needed. They, too, should be in coordinating neutrals.

- *Vinyl/Rubber Base and Carpet Base* - Use vinyl/rubber base in floor areas where the floor surface is vinyl composition tile (VCT) or rubber tile. Base is to be in a coordinating neutral to the floor surface, as near the same shade as possible. Do not use a dark color or accent color for the base. Use a 4" carpet base capped with a dark neutral vinyl/rubber carpet cap in carpeted areas. Use the same carpet for the base as meets the wall in the case of borders. When carpet tile is used it will be necessary to use a vinyl/rubber base. Choose a neutral that will most closely relate to the carpet coloration or wall coloration. With carpet tile, a straight base must be used (one without a cove foot) and installed first with the carpet tile butted up to it. In ceramic tile areas, if a base is used it will be a coordinating ceramic tile base.
- *Ceramic Tile* - Use a mottled, flecked, or specked floor tile if at all possible. Also be sure to use a dark tone grout which coordinates with the floor tile to avoid a stained or soiled appearance. Tile banding accents or patterns are approved for walls and floors provided the accent is another neutral shade which coordinates with the dominant tile color.
- *Doors and Door Frames* - Depending on the quality of the doors, they may either be stained or painted. If painted, they may either be painted a color related to the wall color or an accent color of mid-range hue. Hollow metal door frames are best painted a color close to the wall color or a shade or two darker.
- *Window Blinds* - Metal or vinyl blinds may be horizontal or vertical and are best in off-white or light neutrals. In no case should blinds be of a reflective metallic finish. Dust is not as visible on the light colors as on the dark colors, and vertical blinds collect less dust than horizontal ones. Dark blinds that match the anodized finish of the window frames are acceptable, provided the windows are of reflective glass. If the windows are not of reflective glass, dark blinds will radiate a great deal of heat into the building rather than reflecting it as light or off-white blinds will do. Window shall also have black-out panels. Panels shall be rod operated from one side only.
- *Carpet* - (See ETL 94-3: Air Force Carpet Standard and revised ACC Carpet Guidance - dated 12 October 1993). In general, use mainly bold tweed, nylon, level-loop carpet of at least 28 oz. face weight. Bold tweed means yarn of several different colors, not various shades of the same color. Level-loop is the most hard-wearing type of carpet, and bold tweed allows for several upholstery color coordinations in a facility using only one carpet color-way. Again, use a 4" carpet base capped with a vinyl/rubber, dark neutral carpet cap.
- *Dormitory Carpet* - Carpet dormitories by using one carpet pattern per building with a different color-way per floor. Take care to insure that carpet used in living areas is not the same carpet used in the work areas on the base. Do not use dull, drab colors in living areas.

Bedspreads and chair upholstery can be coordinated per floor to the carpet color-way. Draperies in these small living areas are best kept in neutral colorations to blend with the walls. This provides a neutral background for personal items of the occupants.

Carpet Borders - Carpet borders may be solid in color. They may be used with either carpet tiles or roll goods. Be careful not to over-do borders. In corridors a border of about nine inches is about right. Install field carpet in rectangular shapes and allow border to fill in indentation such as doorways, drinking fountains, etc. Do not use borders in rooms where the furniture will cover the borders.

Systems/Prewired Workstations/Modular Furniture - All panel fabrics are to be either brown-tone or grey-tone neutrals. Work surfaces flipper doors, etc. shall complement brown and grey fabric panels. Only one type of systems furniture should be used per building in order to allow greater flexibility in reconfiguration as occupants, needs and requirements change and to provide continuity throughout the space. Systems furniture should be installed over carpet tiles. Removal and installation of new carpet in twelve foot widths becomes a major undertaking. A professional team must be hired to dismantle, store, then re-install the systems furniture. This is not efficient or cost effective. Carpet tile will allow for self-help replacement and ease of maneuvering under the systems furniture. Carpet tile will also accommodate flat-wiring for electrical and communications under the carpet.

2.D Door Hardware

Door Hinges - Exterior Door hinges shall be stainless steel, heavy weight ball bearing. Interior hinges shall be stainless steel, ball bearing or plain bearing. All hinges shall be Satin Chrome finish.

Door Closers - Door closers shall be Grade 1, surface mounted, regular or parallel arm mount. Finish shall be BMHA689, Sprayed Aluminum.

Exit Devices - Doors shall have Type 1, rim exit device (no vertical rod type). Push bars shall be rail style as opposed to open bar type. Finish of all exit devices shall be Satin Chrome.

Locksets - Interior and exterior shall be BMHA Series 4000, Grade 1, knob trim, interchangeable core function as required (see BMHA ANSI function F75-F93). Lever handles shall be provided at all locations requiring full disabled accessibility. Finish of levers, knobs and all misc visible parts shall be Satin Chrome finish.

Miscellaneous Hardware - Stops, flushbolts, etc. shall be Satin Chrome finish. Misc. hardware associated with bronze aluminum storefront type entrances may match the door frame finish.

Armor, kick and mop plates - shall be stainless steel, 0.050" (U.S. 18 Gage).

Thresholds - shall be extruded aluminum.

Exposed rubber parts - on holders, stops and bumpers shall be grey.

Door hardware should be selected and sized on a case by case basis for its specific function. In order to unify the quality and appearance of hardware basewide, the above recommendations should serve as a guide to finish and quality level expected of hardware that may not be specifically listed. All hardware design shall be approved by the Base Civil Engineer.



Part IV -
Landscape
Standards



1. INTRODUCTION

Holloman AFB's location in southeastern New Mexico in the Chihuahuan Desert presents unique challenges to the planned landscape. The environmental constraints of the high desert are manifold, and include limited water resources, saline soils, and extreme day-to-night temperature fluctuations. In response to these conditions, landscape design should emphasize native plant species requiring minimal water or pesticides, and adopt low-water-use landscape practices known as "xeriscaping". Appropriate landscape design will positively impact base maintenance operations, water conservation and use of pesticides while improving overall base aesthetics.



2. ACC LANDSCAPE DESIGN POLICY

Landscape design on ACC Bases should reinforce the same basewide harmony that is described in the architectural design policy statement on page 10.

3. LANDSCAPE PLANNING

3.A Current Conditions

Great effort has gone into the establishment of basewide landscaping at Holloman AFB. With the constraints of the harsh desert climate, traditional approaches - tree lined streets, dense multi layered planting banks and thick screens of vegetation - are simply not practical. In many cases site walls and building placement serve the visual and wind screening function that hedgerows would provide in a more moderate environment. The most successful landscape applications at Holloman implement basic landscape design principles adapted to the specific climatic constraints. Landscaping is successfully used basewide as visual screening, entry and intersection punctuation and to define borders and street edges at many individual locations.

While various individual landscape installations are fairly successful, the most evident landscape planning issue basewide is the absence of landscaping continuity. In Zone 2, for instance, successful landscape treatments may occur on one block, while an adjacent block has no landscaping at all. Successful street edging may abruptly end at a field of gravel and sand. A long term masterplan based on sound landscape design practice can eventually result in the continuity needed. It is not the intent of this document to present a landscape masterplan. It is critical, however, to outline general landscape planning approaches that begin to reinforce a basewide visual harmony.

3.B General Recommendations

Basewide

- Landscaping planning should be based on xeriscape practices (See Landscape Standards, Section 4) and incorporate species from the approved list in Landscape Standards, Section 7. It is the designer's responsibility to select specific plant species from the plant list with the appropriate character, height, etc. for the specific function and aesthetic outcome desired.
- Planning should also consider the likelihood of an above average loss of plant material. Avoid planning equally spaced, repetitive rows of planting. The harsh conditions dictate an approach that will allow for loss of some plant material without disrupting the overall planting scheme.
- Basewide, landscaping should be used, in conjunction with site walls, for visual screening of mechanical equipment, dumpsters, loading docks, etc. Locate equipment, dumpsters, loading docks, etc. away from building fronts and other high visibility areas.
- Plan landscaping to define street edges and punctuate main intersections. See Landscape Standards, Section 8, for examples.
- Use landscaping to punctuate parking lot entrance at major buildings and to visually screen parking lots from public view. Refer to Landscape Standards, Section 9, for specific recommendations.
- Use of canopy trees and evergreens, due to below average survival rates, should be limited. Playgrounds, picnic areas, and community open

spaces should use trees in conjunction with manmade structures if possible to provide shade and shelter. While encouraged in Zone 3, new tree patterns should, as with all new landscaping at Holloman AFB, avoid formal repetitive placement that would be adversely affected by the loss of individual specimens.

Zone 1

- Mission support facilities and facilities fronting or having prominent facades visible from Delaware Avenue should follow Zone 2 guidelines. Landscape planning for mission specific facilities such as hangars and maintenance/storage buildings should be purely functionally driven. This could, in some cases, result in no landscaping at specific buildings.

Zone 2

- Major, high visibility buildings and major activity areas should be punctuated by defined entry plazas. Planting, special pavement and site furnishings should be incorporated as appropriate to reinforce the prominence of the building.
- In all cases landscaping should be incorporated to define building entry.
- Planting should be used adjacent to buildings to assist in defining primary spaces relating to the building (courtyards, paths, parking, seating plazas, break areas, etc.) and to address building scale. Planting should, in general, be more substantial against the building and diminish as distance from the building increases.

4. PLANTING / XERISCAPING

4.A Current Conditions

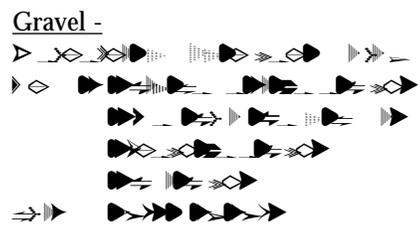
Existing planting materials and methods visible at Holloman AFB demonstrate, in physical form, the basic landscape conflict that must be resolved in any harsh climate; indigenous versus non-indigenous landscape design. Both can be found throughout at Holloman. While some non-indigenous plants have adapted well to the desert climate, most imported plant material at Holloman suffers because of the harsh soil and weather conditions. Those that appear to survive, both plant material and groundcover, do so because of drastic measures. Extensive irrigation, construction of plant wells stocked with imported soils, etc. allow imported plant species to survive. They also, however, all involve high maintenance and expense. Even the mature shade trees and established lawns in the military and family housing areas survive based on irrigation. Most native plant material used on the base fares relatively well with limited maintenance required.

The most positive landscape trend on the base is clearly the use of native or naturalized plant material requiring minimum water combined with gravel and mulch ground covers. This practice, referred to as xeriscaping, reduces the need for irrigation and maintenance. The dining hall (Building 812) illustrates a very successful example of a low maintenance xeriscape application using native plants, gravel ground cover and boulders. Another dramatic application of this approach can be observed at the Intersection of Sixth and Delaware. While variation from this xeriscape approach may be justified in some instances it is clearly the most logical and aesthetically pleasing direction currently in use at Holloman.

4.B General Recommendations

- Utilize xeriscape principles in all plant material selection and landscape design at Holloman AFB.
- See the attached plant list for recommended native or naturalized plant species.
- The harsh conditions of the high desert limit the use of plant material as a viable ground cover. Plant material, if used as groundcover, should be selected based on limited water and maintenance requirements.
- Alternatives to vegetative ground covers is the use of gravels or mulches. Gravels in multiple colors and sizes allow a variety of application options. Mulch use shall be used limited due to it's moisture content and drying effects of the sun. Gravel and mulch offer sustained color as well as limited maintenance.

4.C. Approved Products/Treatments





Xeriscaping at dining hall

5. IRRIGATION

5.A Current Conditions

Irrigation is widely used at Holloman to support both native and imported plant material. Most significant landscape installations on the base will be irrigated at least until well established. A large portion utilize permanent irrigation to survive including most lawns, smaller trees and monumental landscape installations. Both "bubbler" and "drip" systems are currently in use. Irrigation, while enabling new plants to establish and older plants to survive, is a burden on an already limited resource. In addition, overwatering can draw soil-borne salt to the surface in amounts fatal to many plant species.

5.B General Recommendations

- Temporary irrigation should continue to be used as a means to establish native or naturalized landscape installations. Permanent irrigation should be limited to major landscape applications at focus areas and special situations only. All irrigation installations must be approved by Base Civil Engineering and Base Architect.
- Due to mineral buildup in drip irrigation systems, bubbler or spray head type systems with minimum 1/2" PVC piping should be used.

5.C Approved Products/Treatments

- Refer to Base Civil Engineering for current irrigation practices.

6. LANDSCAPE MAINTENANCE

See Maintenance Manual for Landscape Masterplan Holloman AFB, New Mexico.

7. PLANT LIST

The plant list on the following pages represents species suitable for the Holloman AFB microclimate. Additional plants not listed may be suitable for the base. These plants should be alkaline and drought resistant and must be able to withstand temperatures to 15°F





Irrigated plant wells in the dormitory complex

Recommended Plant Species: Trees

Common Name / Botanical Name	Description	Culture
Arizona Ash <i>Fraxinus velutina</i>	Medium size deciduous tree, 40' high x 30' wide. Light green leaves to 8", grey furrowed bark. Flowers in early spring in 1" clusters	Cold hardiness: to -10F Soil type: well drained Light: full sun Water: moderate Prune: to train or shape in winter
Texas Ash <i>Fraxinus pensylvanica</i> 'Texensis'	Medium size deciduous tree, 30' high x 25' wide. Bright green leaves and good fall color (yellow, gold, red).	Cold hardiness: to 0F Soil type: well drained ALKALINE TOLERANT Light: full sun to partial shade Water: moderate
Honey Locust <i>Gleditsia triacanthos</i>	Medium size deciduous tree, 50' high x 35' wide. Compound leaves with light green leaflets. Flowers are green pealike clusters 2-5" long . May-June	Cold hardiness: to 0F Soil type: well drained Light: full sun Water: moderate
Afghanistan Pine <i>Pinus eldarica</i>	Evergreen tree, 50-80' high x 15-30' wide. Dark green pyramid shade and 3-6 needles in clusters. Insignificant flowers; cones 5-6".	Cold hardiness: to 0F Soil type: well drained Light: full sun Water: minimal
Allepo Pine <i>Pinus halepensis</i>	Evergreen tree, 30-50' high x 20-30' wide. Open branched, rounded top tree with slender, grey-to light green, 3-4" needles in bundles. Insignificant flowers; rounded to oblong brown cones 2-4", that ripen in fall.	Cold hardiness: to 10F Soil type: well drained Light: full sun Water: moderate Pruning: thin periodically to prevent wind damage
Chinese Pistache <i>Pistacia chinensis</i>	Deciduous tree, 40-50' high x . 40-50' wide. Lustrous green foliage; short-petioled leaves about 1' long in 10 or more leaflets. Clusters of small, not showy, flowers in spring. Good fall color.	Cold hardiness: to 0F Soil type: well drained \ adaptable Light: full sun Water: minimal Pruning: young trees form heavy canopy

Recommended Plant Species: Trees

Common Name / Botanical Name	Description	Culture
Mexican Elder Sambucus mexicana	Deciduous tree, 10' high x 15' wide. Foliage is medium green small leaves that drop in winter. Flowers are small white clusters.	Cold hardiness: to 15F Soil type: any ALKALINE TOLERANT Light: full sun Water: moderate
Desert Willow Chilopsis linearis	Small deciduous tree. 20' high x 15' wide. Medium green narrow leaves. Blooms from Apr-Dec. Pink or lavender flowers are shaped like small orchids.	Cold hardiness: to 10F Soil type: well drained Light: full sun Water: moderate Pruning: needed if tree shape desired
Desert Olive Forestiera neomexicana	Small deciduous tree, 12' high x 8' wide. Light gray bark, small light green leaves.	Cold hardiness: to 10F Soil type: any Light: full sun Water: moderate to none Pruning: to encourage tree habit
Honey Mesquite Prosopis glandulosa	Medium sized tree, 25' high x 30' wide. Small fern like leaves are bright green. Smaller branches are covered with thorns	Cold hardiness: to 0F Soil type: well drained Light: full sun Water: moderate Pruning: needed if tree shape desired
Stone Pine Pinus pinea	Medium sized evergreen tree, 40' high x 35' wide. Bright green needles 3-7" long. Cones ripen in fall 4-6" long.	Cold hardiness: to 10F Soil type: any Light: full sun Water: moderate

Recommended Plant Species: Trees

Common Name / Botanical Name	Description	Culture
Arizona Cypress <i>Cupressus arizonica</i>	Evergreen tree, 20-30' high x 12-15' wide. Dense pyramid-shaped conifer with silvery, grey-green foliage; dark fissured bark. Tiny flowers in spring, 1" cones.	Cold hardiness: to -20F Soil type: well drained \ adaptable Light: full sun Water: minimal Pruning: low foliage as desired
New Mexico Locust <i>Robinia neomexicana</i>	Deciduous tree, 12-20' high x 15' wide. Medium green leaves and showy rose pealike flowers. Flowers appear Apr-Aug. Bean pods in fall. Forms thorny thickets.	Cold hardiness: to -20F Soil type: well drained \ adaptable Light: full sun to partial sun Water: minimal Pruning: single or multi-trunk
Netleaf Hackberry, Western Hackberry <i>Celtis reticulata</i>	Deciduous tree, 25-30' high x 25-30' wide. Spreading with irregular form and pendulous branches; rough, dark green leaves (oval 1-3"). Bark is grey to reddish brown. Tiny flowers in spring, not showy; red to orange berries in fall.	Cold hardiness: to -20F Soil type: well drained \ adaptable Light: full sun - partial shade Water: frequent/warmest months Pruning: winter to shape/expose form
Russian Olive <i>Elaeagnus angustifolia</i>	Deciduous tree, 20-25' high x 15-20' wide. Small tree that resembles the olive with grey foliage, lance shaped leaves (1.5-3" long) and silvery below; dark rough bark, spiny branches. Fragrant, small, yellowish flowers . in early summer	Cold hardiness: to 0F Soil type: adaptable Light: full sun Water: moderate Pruning: young for shape desired or as hedge

Recommended Plant Species: Shrubs

Common Name / Botanical Name	Description	Culture
Turpentine Bush <i>Ericameria laricifolia</i>	Small evergreen shrub 2' high x 3' wide. Foliage is bright green, needle like leaves. Flowers from Sep-Nov. Flowers are clusters of small yellow blooms.	Cold Hardiness: to 5F Soil type: well drained Light: full sun Water: moderate to none Pruning: when leggy
Whitehorn Acacia <i>Acacia constricta</i>	Large spreading shrub, 10' high x 15' wide. Covered with large white thorns. Yellow ball like flowers in late spring.	Cold Hardiness: to 0F Soil type: any ALKALINE TOLERANT Light: full sun Water: moderate to none
Feather Dalea <i>Dalea formosa</i>	Low rounded or spreading flowering shrub, 2' high x 2' wide. Foliage is semi evergreen light green small leaves. Blooms from Mar-Sep. Flowers are 1" clusters of small violet blooms.	Cold hardiness: to 0F Soil type: well drained / adaptable Light: full sun Water: minimal
Rabbitbush <i>Chrysalthamnus naseosus</i>	Small evergreen shrub, 2' high x 2' wide. Bright green leaves. Clusters of small bright yellow flowers in spring.	Cold Hardiness: to 0F Soil type: any ALKALINE TOLERANT Light: Partial shade Water: minimal
Agave Agave sp. Century plant	Evergreen shrub, 2-6' in diameter. Fleshy succulent leaves rising spirally in a rosette. Takes decades to flower, when it flowers (yellow clusters 6-15' stalk) its rapid.	Cold hardiness: to 0F Soil type: well drained / adaptable Light: full sun Water: moderate
Skunkbush <i>Rhus tribolata</i>	Deciduous shrub, 3-5' high x 5-6' wide. Densely branched, spreading shrub with dark green oval leaves. Sprg-Sum, red/purple in fall. Greenish flowers in spikes before leaves.	Cold hardiness: to- 30F Soil type: well drained Light: sun to partial shade Water: minimal Pruning: minimal/accepts shearing

Recommended Plant Species: Shrubs

Common Name / Botanical Name	Description	Culture
Apache plume <i>Fallugia paradoxa</i>	Semideciduous shrub, 3-6' high x 5-8' wide. Open with flaky bark, leaves dark green above and rusted above. Leaves clustered in linear segments. Showy white flowers (roselike) 1.5" across May-June.	Cold hardiness: to 0F Soil type: well drained / adaptable Light: full sun to partial shade Water: minimal Prune: in winter to shape
Bush Morning Glory <i>Ipomoea leptophyll</i>	Perennial shrub, 2-3' high x 3-5' wide. Rounded bush with lavender flowers 3" diameter and 4" long (May-June).	Cold hardiness: to 10F Soil type: well drained Light: full sun Water: moderate
Desert Marigold <i>Baileya multiradiata</i>	Evergreen shrub, 1' high x 2' wide. Bright yellow daisy-like flowers held high above the low, grey foliage. Possible to bloom year-round (low desert).	Cold hardiness: to 10F Soil type: any Light: full sun to very light shade Water: minimal
Red Yucca <i>Hesperaloe parviflora</i>	Dark green spiked leaves in 3'-4' clusters. Deep pink bell shaped flowers on 5' stalks from Spring-Fall. Hardy	Cold hardiness: to 12F Soil type: any Light: full sun Water: moderate Pruning: dead flower stalks
Winterfat <i>Ceratoides lantana</i>	Small evergreen. Up to 2' high x 5' wide. Linear branches and 1' x 1/8' blue green leaves are covered with white to rust colored hairs. Small flowers April-July, but fruit spikes are very showy.	Cold hardiness: to 0F Soil type: well drained any ALKALINE TOLERANT Light: eastern exposure Water: moderate to none Pruning: cut to ground
Shrubby Cinquefoil <i>Potentilla fruticosa</i>	Semievergreen shrub, 2-3' high x. 2-3' wide. Five fingered leaves crowd the intricately branching limbs. Bright yellow flowers from June-Sep. (1" roseline).	Cold hardiness: to 0F Soil type: well drained \ adaptable Light: full sun to shade Water: moderate

Recommended Plant Species: Cacti

Common Name / Botanical Name	Description	Culture
Barrel Cactus Ferocactus sp.	Small ribbed barrel. Grows slowly. Hardy	Cold hardiness: to 12F Soil type: any Light: full sun Water: none
Golden Barrel Cactus Encinocactus	Large barrel cactus. 2' - 3' in diameter. Slow growing. Hardy.	Cold hardiness: to 12F Soil type: any Light: full sun Water: none
Ocotillo Fouquieria splendens	Large cactus. 15' high x 10' wide. Gray thorn covered branches radiating from central base. Green leaves along branches if watered. Spectacular red flowers in spring.	Cold hardiness: to 12F Soil type: any Light: full sun Water: none
Pickley Pear Opuntia	Small prickly pear cactus. To 2'. Cactus grows in clusters of pads covered with spines. Sold bare root. Hardy	Cold hardiness: to 12F Soil type: well drained Light: full sun Water: none
Hedgehog Cactus Echinocereus	Small cactus, range in size from 2-5" to mounded forms of 2-5'. Flower colors range from red, purple, yellow and magenta (dependent on variety selected).	Cold hardiness: to 12F Soil type: well drained Light: full sun Water: none
Tree Cholla Opuntia imbricata	Medium sized cactus, 3-8' tall. Intricately branching stems look like braided rope. Showy red flowers in spring-summer (2-3 inches).	Cold hardiness: to 12F Soil type: well drained Light: full sun Water: none

Recommended Plant Species: Sages

Common Name / Botanical Name	Description	Culture
Violet Silverleaf Leuophyllum candidum	Small flowering sage. 3' high x 3' wide. Silver-green leaves, violet bell shaped flowers from Sep-Oct.	Cold hardiness: to 10F Soil type: well drained Light: full sun Water: moderate
Texas Ranger Leucophyllum frutescens	Large flowering sage, 6' high x 8' wide. Silver-green leaves. Pink-purple flowers are 1", bell-shaped. Blooms in summer.	Cold hardiness: to 10F Soil type: well drained Light: full sun Water: moderate

Recommended Plant Species: Grasses

Common Name / Botanical Name	Description	Culture
Sacaton Sporobolus wrightii	Mounded bunch grass to 3' high x 3' wide. Large, multi-branched seed stalks to 6'.	Cold hardiness: to 12F Soil type: any Light: full sun Water: moderate to none
Big Bluestem Andropogon gerardii	Large columnar shaped grass to 6' high. Foliage is blue green then brilliant fall color change.	Cold hardiness: to 12F Soil type: any Light: full sun Water: moderate
Buffalo Grass Buchloe dactyloides	Low growing native grass 4-6" height. Sage green color, turns brown in winter. Hard to establish, tolerates abuse once established.	Seed rate: 3-4 Lb/1000QF Soil type: any Light: full sun Water: moderate to none
Blue Grama Grass Boutoua gracilis	Low growing bunch grass. to 1-1/2' high. Fine bladed texture, will establish turf. Light green color. Tall seed heads.	Seed rate: 3-4Lb./1000QF Soil type: any Light: full sun Water: moderate

Recommended Plant Species: Groundcover / Vines

Common Name / Botanical Name	Description	Culture
Blackfoot Daisy Melampodium leucanthum	Evergreen groundcover, 6-12" high x 1-1.5' wide. A low, grey-green perennial with massive displays of flowers; woody base; leaves about 1.5", lanced shaped.	Cold hardiness: to 0F Soil type: any Light: full sun Water: minimal Prune: cut back in fall
Mexican Primrose Oenothera berlandieri	Evergreen, 6-12" high x 1-3' wide. Spreading perennial with a profusion of flowers, oval, bright green leaves to 2". Flowers are pink, 1.5" almost continuously present Spring-Summer. Blooms during the day	Cold hardiness: adaptable Soil type: adaptable Light: full sun to partial shade Water: moderate Prune: clip to ground after blooming
Coral Honeysuckle Lonicera sempervirens	Evergreen, woody vine perennial. Flower (red) throughout year, mostly in spring, summer; cluster of 1-2" long trumpet-shaped flowers.	Cold hardiness: to 0F Soil type: well draining \ adaptable Light: full sun to partial shade Water: moderate

8. STREETS

8.A Current Conditions

The streets of the main base area are in a grid oriented roughly northwest-southeast and southwest-northeast. Zone 3, the Family Housing area, exhibits a more serpentine residential street pattern with some cul-de-sacs, typical of "neighborhood" planning. First Street is the primary artery leading from the main gate to the flight line. Several roads intersecting First Street provide secondary loops and cross connections between various areas of the base. These include Delaware Avenue, Mesquite Road, and Arizona Avenue. Delaware Avenue is also the boundary between the main base area and the flight line.

Roads are currently well maintained, almost all with

curb and gutter and generally well marked. Street edge treatments, however, vary greatly. Along First Street, for example, gravel and landscape beds abruptly transition into areas planted with struggling imported turf. Many streets have no edge treatment other than sidewalks and vast areas of gravel groundcover. There are no extended, consistent street edge treatments that might define major roadways and contribute to the visual "sense of place" at Holloman.

There are bright spots, however. Pedestrian lighting combined with gravel groundcover and landscaping create a strong, formal street edge at the Child Development Center. Attractive landscape treatments can be seen at several main intersections (the south corner of New Mexico Avenue and First Street, for example) and at parking lot entrances such as at Building 317.



Successful Landscape Treatment identifies Building 317 parking lot entrance and defines street edge

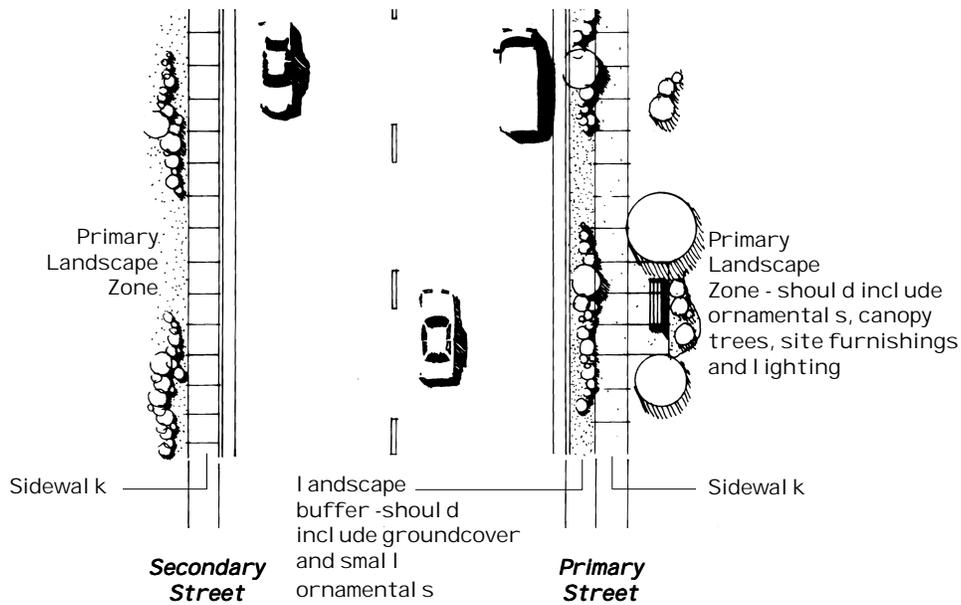
Along the flight line side of Delaware Avenue, a strong street edge is beginning to develop due to the construction of several prominent masonry site walls in combination with dramatic indigenous landscaping. There are even a few tree lined streets in the family housing zone. These street edge treatments are positive trends that create, if only in isolated pockets, visual edges and punctuation points at main roadways and destination points.

8.B General Recommendations

General streetscape improvements should be considered as an integral part of any new street improvement or building construction project. The introduction of xeriscaping along existing street edges along with hardscape improvements, i.e., concrete sidewalks, site furnishings and light standards will improve the overall aesthetics and

begin to create a sense of place for Holloman Air Force Base.

- Street edge landscaping is strongly encouraged on all primary and secondary roads. Although larger approved specimen trees may be used at strategic locations, the development of an evenly spaced shade tree street edge is not recommended in the microclimate of Holloman.
- Major intersections and major parking lot entrances should be punctuated by landscaping applications. Limit landscaping and site walls within 50 feet of intersections and entrances to three feet in height to ensure minimum 100 foot unobstructed views of traffic. No walls, shrubs or trees should occur within 20' of any road intersection that may obstruct views. Refer to Department of Defense standards for exact unobstructed view requirements.



Recommended street edge treatment at primary and secondary streets

- Masonry site walls (see Architectural Standards, section 7) should be continued along the northwest street edge of Delaware Avenue as both a defined boundary and a visual buffer between the flight line area and the remainder of the base.
- Site walls should be incorporated along street edges at neighborhood boundaries and at boundaries between mission zones and other base zones.

8.C Approved Products / Treatment

- Refer to Architectural Standards, Section 7, for approved site wall materials and treatments.
- See Landscape Standards, Sections 3 and 7, for approved plant materials and applications.



Successful street edge treatment at child development center

9. PARKING

9.A Current Conditions

A variety of parking configurations, both good and bad, can be observed at Holloman. In Zone 2, the intersection of Tabosa and Arkansas Avenues illustrates the range. A well screened and landscaped parking lot serving Building 71 demonstrates how lot placement and landscaping can minimize the impact of parking. Directly adjacent, at Building 55, parking extends solidly from the street edge to the building, with no landscape buffer, visually blocking the building entrance. Parking overwhelms the building. In Zone 3, there is a mix of on-street, driveway and small lot parking; off-street parking is at a premium.

9.B General Recommendations

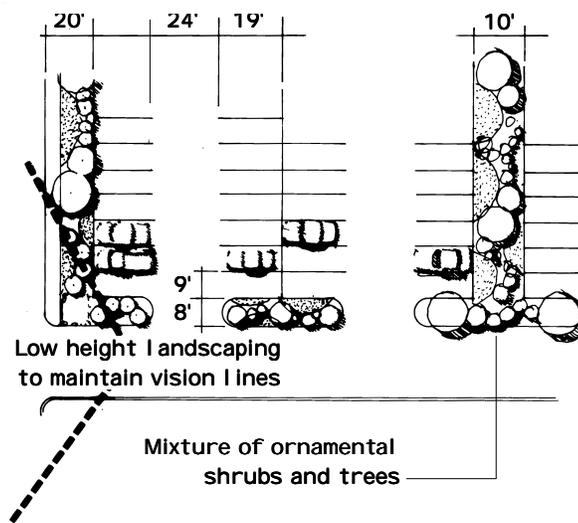
- Do not locate parking directly in front of a building or entrance. Do not locate parking between a main viewing street and the building. If possible, parking should be located behind the building it serves. In no cases should parking be designed "on-street".
- Effective screening helps soften the visual character of large parking areas. Parking lots at Holloman should be screened from public rights of way and adjacent buildings by approved landscaping or solid masonry site walls along major street edges.
- Use separate parking lots accommodating 50 cars or fewer rather than large lots of 200 or more. Where large parking lots exist or are required by functional layout, landscape approximately ten percent of the lot. Screen lots and break up large expanses of paving with planting islands and buffer strips. Plant evergreen shrubs at a minimum height of 4 feet (3 feet minimum at installation) combined with

xeriscaping placed at the lot perimeter and in islands.

- Parking areas should have standard and handicapped stalls, and twenty-four feet driving aisles. Standard parking stalls should be designed to a minimum of 9'x18'. Handicapped stalls should be either standard parking stalls with a 5' common area between stalls or an expanded standard stall, minimum of 12'x18'. All parking areas are to be striped and signed.
- Zone 3 parking should generally allow for an average of 1.5 spaces per unit of off-street parking. Additional parking should be accommodated through the use of strategically placed banks of parking spaces perpendicular to the street.

9.C Approved Products/Treatments

- See Landscape Standards, sections 3 and 7, for approved plant materials and xeriscaping applications.



Recommended Parking Lot treatment



(Top) Effective parking lot - although located in front of the building, the smaller size and well screened perimeter minimize its impact

(Bottom) Inappropriate parking lot - too large, located directly in front of building, lacks landscape screening

10. SIDEWALKS/CURB AND GUTTER

10.A Current Conditions

Sidewalks and curb and gutter installations are generally present and in fairly good condition basewide at Holloman. Some however do show signs of deterioration due to the soil conditions. The continued use of sidewalks and curb and gutter at appropriate locations should be considered mandatory.

10.B General Recommendations

- Sidewalks shall be utilized within pedestrian use areas along streets and parking lots.
- Sidewalks should be a minimum four feet wide, with eighteen inch wide gutters with six inch high curbs, or any combination thereof, as appropriate.
- A minimum 5' wide landscaping strip should be incorporated between edge of curb and edge of sidewalk along primary roads (First Street and New Mexico Avenue). Sidewalks along secondary roads do not require landscaping strips.
- To reduce harsh reflections in the bright New Mexico Sun, concrete for sidewalks, curbs, and gutters shall be colored with an integral color pigmentation. Colors shall be earth tone grays or tans, and may be coordinated with building materials. Zone 3 sidewalks should occur on both sides of the street.

11. PEDESTRIAN CROSSWALKS

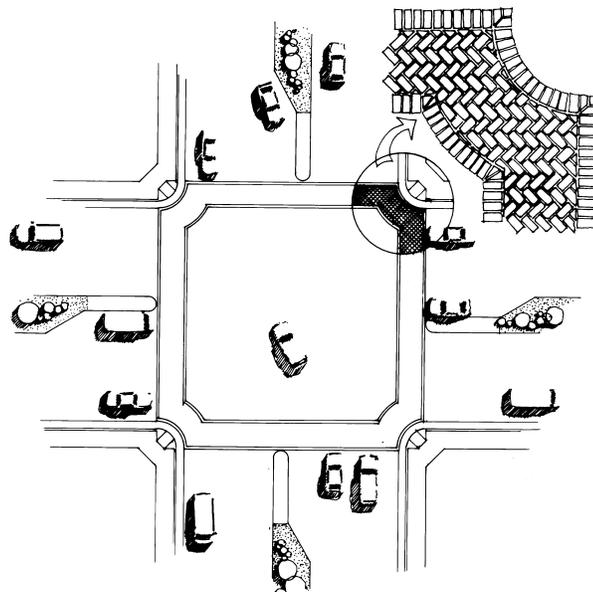
11.A Current Conditions

Well defined crosswalks, those easily identified by vehicular traffic, are currently at a minimum at

Holloman AFB. Although traffic over most of the base cannot be classified as heavy, several major pedestrian/vehicular conflict spots are present. At "rush hour," First Street presents the most obvious conflict zones, particularly at its intersection with Santa Fe Drive.

11.B General Recommendations

- Inclusion of pedestrian crosswalks at intersections should be included as a part of any paving or street improvement project at Holloman AFB.
- High traffic intersections should incorporate paved crosswalks, with an 8' band made of 4"x8" masonry pavers laid in a herringbone pattern facing traffic and outlined by a single header course of 4"x8" pavers.
- Where pedestrian traffic does not warrant paver crosswalks, a pattern similar to that proposed above should be applied using paint or high reflective tape.



Recommended Pedestrian crosswalk treatment

12. SITE LIGHTING

12.A Current Conditions

Site lighting has generally been approached on a facility or project specific basis rather than as a basewide issue. Building, parking lot and street lighting varies from facility to facility. Rectilinear bronze light fixtures at Building 812 and at the Child Development and Youth Centers respond well to the buildings' architectural character, and begin to create a consistent image.

12.B General Recommendations

- All lamps shall be high pressure sodium.
- All poles shall be square, straight aluminum. For mounting height over 35 feet, a square steel pole, tapered toward the top shall be used.

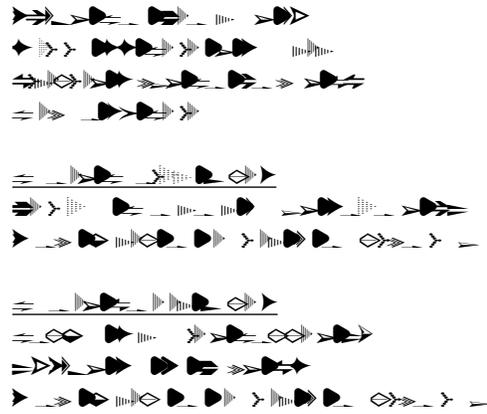


Standard I light pole

- Luminaires and poles shall be anodized or duranodic bronze aluminum or matching color bronze painted steel finish with appropriate NEMA distribution for its intended function.
- All luminaires shall be rectilinear. Roadway luminaires shall be arm mounted.
- Average mounting heights shall be as follows:
 Sidewalk and plaza lighting - 12' - 50'
 Special purpose lighting - 20' - 30'
 Parking and Roadway lighting - 30' - 50'
- Selection of poles and fixture types for specific functions should be consistent throughout the base.
- Lighting levels and installations should vary with the volume and type of traffic and the visual character desired.
- Coordinate street and sidewalk lighting locations with site amenities (landscaping, furnishings, signs).

12.C Approved Products/Treatments

Luminaires:



13. COURTYARDS, SHELTERS

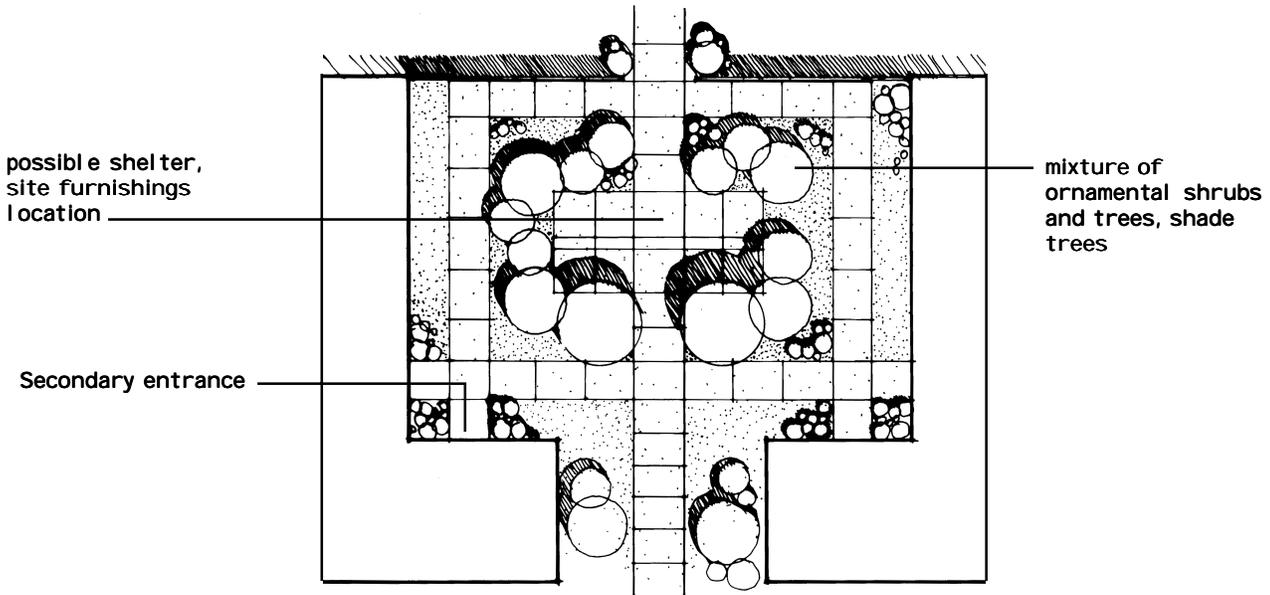
13.A Current Conditions

Outdoor courtyard and shelter areas can be found at various locations on the base serving various functions. Picnic shelters are a prominent part of the plaza design in the dormitory complex. The Child Development Center (Building 650) has an walled interior reading courtyard protected from wind and sun. These are not the norm. Some locations warranting shelters such as playgrounds and parks are, unfortunately, without areas to escape the elements.

A need exists at Holloman for more exterior courtyard and shelter spaces, protected from the elements, for staff break areas, picnic shelters, shaded playground observation, etc.

13.B General Recommendations

- Protected outdoor employee break areas, picnic shelters, playground and park shelters, etc. should be included, when justified by occupancy, in new construction, improvement and renovation projects. Shelters should be included in all new playground and park designs.
- Outdoor shelters and courtyards should generally conform to the architectural guidelines of the Zone in which they occur. If serving a specific building, materials used should match the building being served.
- Orient shelters and courtyards to take advantage of climatic conditions, such as seasonal sun, shade, and breezes.





- Provide site furnishings, lighting and landscaping as necessary to both support the function and create an inviting gathering zone.

13.C Approved Products/Treatments

Refer to previous applicable sections for building materials, landscaping , site furnishings, etc.



(top) inappropriate shelter design - does not reflect character or materials of adjacent building

(bottom) successful shelter at dormitory complex - split faced cmu matches material and proportion of adjacent dormitories

14. SITE FURNISHINGS

14.A Current Conditions

While site furnishings and related pedestrian amenities are present at Holloman, applications are largely facility specific rather than adhering to a basewide standard.

14.B General Recommendations

- Site furnishings should be considered in all new construction, renovation and street improvement projects. When site furnishings are functionally warranted the furnishing selections should be standardized basewide in order to reinforce the overall visual harmony.
- Consider climatic conditions in selection and placement of all site furnishings. Solar factors such as direct heat gain on metal components (especially play equipment), ultraviolet degradation of plastics and shade for users should be addressed. Wind protection, especially during months characterized by strong prevailing winds should also be considered. When possible take advantage of shelters, landscaping and building mass for solar and wind protection.
- Play equipment selection and placement should consider age groups ranging from pre-school to teen. Place equipment away from vehicular traffic paths in a location easily supervised.

14.C Approved Products/Treatments

Benches:

Victor Stanley Inc., Classic Series Model No. CR-38

Trash Receptacles:

Victor Stanley, Inc., Model S-35 3/8" solid steel bars.

Bike Racks:

Madrax, Heavy Duty Winder Plus (WP158-9-SG-P)

Play Equipment:

Game Time, Fort Payne, Alabama

Little Tykes, Farmington, Missouri



Part V -
Signage
Standards

1. EXTERIOR SIGNS

1.A Current Conditions

For the most part, signs at Holloman AFB are in conformance or close to being in conformance with ACC standards. Exterior signage is generally fairly subtle and in a color palette harmonious with the architecture. Signs are held to a minimum and where special signs (free-standing, marquee signs, etc.) are used they are generally appropriate in size, location and design. As with much of the architectural design at Holloman the more recent buildings present the most positive and consistent sign trends.

1.B Signs (General)

The number of signs should be held to the minimum required for identification and customer service. Color policy for individual lettering attached to buildings, structures, monuments or entryway glass is white, beige or bronze. Color policy for other types of exterior signs is white letters on brown background and brown posts with the exception of signs relating to safety and governed by national standards applicable to the USAF. Such exceptions include traffic control signs governed by the Manual of Uniform Traffic Control Devices (MUTCD) and signs governed by OSHA. Examples include regulatory and traffic control signs (speed limit signs, stop signs, yield signs, etc.) and hazard/danger signs required by OSHA. Such special signs mandated by national standards must be of the required colors and design. All signs on base will adhere to standards set forth in AFP 88-40 (*except that color shall be white letters on brown backgrounds and posts shall be brown*), ACCR 88-1 and MUTCD.

1.C Building Identification

All buildings at Holloman shall have a street address affixed near the main entrance. The street address is sufficient to identify the majority of the facilities on Holloman AFB.

Zones 1 and 2

Street address applications shall be individual bronze dimensional letters mounted directly to building fascia or exterior wall adjacent to the facility's main entry.

If a building identification name sign is necessary, it will require Base Architect approval. Building identification name signs shall be individual bronze dimensional letters, all capitals, mounted directly to the building fascia or exterior wall adjacent to the facility's main entry or a monument-type sign as directed by base Civil Engineering.

Zone 3

Addresses on residential units in Zone 3 shall be white pressure sensitive letters on a dark bronze metal panel mounted adjacent to the unit's front door, visible from the street.

Tenant units at Holloman AFB will follow the same policies as 49FW organizations.

1.D AAFES/DeCA/Commercial Signs

Logo and lettering supplied by AAFES/DeCA or the parent organization are required to be light bronze or dark bronze.

- Format shall be AAFES logo followed by facility name; i.e., AAFES BASE EXCHANGE. This

format shall be used for all AAFES facilities including shopettes, laundry and dry cleaners, military clothing sales, class six stores.

- Logo and facility name shall be the same height and positioned one continuous horizontal line if possible.
- Facility name shall be spelled out completely with individual letters.
- Logo and letters shall be mounted directly to the building fascia or exterior wall adjacent to the facility's main entrance, visible from the street.
- Logo and letters shall be light or dark bronze anodized aluminum or plastic in a light or dark bronze color. Select finish color for maximum contrast and readability.

- Logo and letters shall be available in even height increments from 2 inches to 16 inches. Choose the appropriate size and color for each facility and location.
- The ratio of height to depth of logo and letters shall be approximately 8 to 1.

1.E Monument Signs

Monument-type signs at Holloman shall be constructed of approved split-face or ribbed CMU with a metal sign insert. Monument-sign standard is available from Base Civil Engineering. Do not use post mounted signs. Monument-type signs must be approved by base Architect.



Monument Sign



Dimensional Building Identification Signage

1.F Other Signs

- Marquee signs are defined as those constructed of masonry, illuminated or non-illuminated, with removable/replaceable lettering for updates. Authorized marquee locations are available from base Civil Engineering. Any requests for new marquees must receive Base Architect approval.
- Revolving or moving signs shall not be used.
- Internally lighted signs shall not be used. When night visibility is functionally required, use external flood or spot lights that illuminate both the and adjacent landscape or building.



Marquee

1.G Lettering Size

For signs other than those covered by ACCR 88-1, size lettering according to the functional viewing distance. Keep sign size to a minimum. The rule to follow for readability is one inch of letter height for each 25 feet of view distance. Example: If a sign is intended to be read from a passing car using a road 100 feet away, the largest sign lettering would be four inches (100 divided by 25 equals 4). Do not oversize. Lettering on all base signs shall be of the same style. Upper case Helvetica medium type style is recommended. Building numbers at Holloman AFB are typically 12"; building names are 18".

1.H. Approved Products/Treatments

- Exterior Wall Mounted Dimensional Letters - Individual characters shall be cast aluminum with bronze Duranodic finish to match Base standard. Characters shall be flush mounted against the wall surface using masonry anchors or threaded screws.
- Pressure Sensitive Lettering - Vinyl sheeting for die-cut graphics shall have a .003 to .006 film thickness and conform to Military Specification M 43719A. Color shall be white. The sheeting shall have a pre-coated pressure sensitive adhesive backing (Class 1) or positionable pressure sensitive backing (Class 3).

2. INTERIOR SIGNS

2.A General Recommendations

The graphics and interior signage shall be provided as a total system and shall be furnished and installed in accordance with AFP 88-40.

Signs shall be clear matte acrylic plastic with subsurface printed background color. Office identification signs shall have a clear sleeve to accept paper or plastic insert identifying tenant or tenants. With more than one door to a space, door numbers shall be alphanumeric, i.e. 110A, 110B, 110C. Restroom door signs shall be MEN and WOMEN graphic symbols, centered and mounted on the door with the top edge at five feet six inches above finished floor.

Height and location of signs shall be in accordance with AFP 88-40 unless otherwise specified. Signs shall be mounted using either vinyl tape or adhesive as recommended by the manufacturer for the specific application. Adhesive shall cover the entire back surface of the sign panel. Signs shall be mounted in place after all other interior work in the immediate vicinity has been completed.

2.B Approved Sign Types

Refer to Department of the Air Force Sign Standards, Document # AFP-88-40, for a full description and specifications of interior sign types.



Part VI -
Engineering
Standards



1. UNDERGROUND PLUMBING

1.A Current Conditions

The soil at Holloman Air Force Base is underlain with well drained soils of fine loam, formed in gypsiferous sediments of folian or alluvial. The soil is highly corrosive. The water table varies from 3 feet to 15 feet below the ground surface.

1.B General Recommendations

- Water piping shall be designed for a maximum velocity of 3 fps, or manufacturer's recommendation, whichever is less. Plastic piping shall be pressure pipe capable of withstanding 165 psi. Trenching, backfilling, and pipe installation shall be done according to manufacturer's recommendations. Pipe shall have minimum cover of three (3) feet.
- No pressure piping shall be allowed under slabs unless it is in a crawl space or pipe chase except for the service entrance. The service entrance shall be perpendicular to the slab edge and not extend more than 5 feet under the slab.
- Sewer lines shall be installed according to manufacturer's recommendations with not less than a 2.5 fps hydraulic velocity flow; minimum main from building shall be 4".
- Sewer manholes shall be precast reinforced concrete manhole sections with two exterior coats of heavy duty bituminous. Manholes shall conform to ASTM C478-72. Position manholes at every 45 degrees and 90 degrees, and a minimum of 300 feet apart.
- Provide reduced pressure backflow preventers at the service entrance. The mechanical make-up water system shall have a separate air gap type (10 gallon tank and float with pressure actuated gear driven pumps) backflow prevention device.
- Gas lines shall have max. working pressure 60 PSIG.

1.C Approved Materials/Treatments

- *Supply Piping* - shall be non-metallic such as:
 - Polybutylene (PB)
 - Chlorinated Polyvinyl Chloride (CPVC)
 - Polyvinyl Chloride (PVC)
- *Waste, Vent, and Drainage Piping* - shall be non-metallic, such as:
 - Acrylonitrile-Butadiene-Styrene (ABS)
 - Polyvinyl Chloride (PVC)
 - Polypropylene (PP)
 - Filament-wound Reinforced Thermo-setting Resin (RTRP)
- *Gas Piping* - shall be non-metallic, such as:
 - Polyethylene

2. ABOVEGROUND PLUMBING



Conditions within the buildings are per industry standards with piping run at right angles to the structure and insulated. Waste piping under slabs exit the building by the most direct route.



- In buildings normally occupied by more than 15 persons, provide separate toilet rooms for each sex; position them together and use a common wall for plumbing chase. In buildings occupied by 1 to 15 employees, a single toilet to serve both sexes may be provided.
- Furnish one water closet, one lavatory, and a room door that can be locked from the inside; This would be true for Zone 1 and Zone 2 only.

2.C Approved Materials/Treatments

- *Water Supply Piping* - PVC/CPVC suitable for transporting water above 150F
- *Compressed Air Supply Piping* - shall be black steel with malleable iron fittings.
- *Waste and Vent Piping* - PVC/CPVC
- *Drainage Piping* - PVC/CPVC

3. PLUMBING FIXTURES

3.A Current Conditions

The plumbing fixtures presently installed at Holloman Air Force Base have been selected based on Federal Specification WW-P-541.

3.B General Recommendations

- Energy conservation washerless fixtures shall be all metal construction, no chrome-plated plastic. All techniques shall be considered, including 1 gpm flow restrictors for faucets, 3 gpm low-flow shower heads, single control mixing type faucets, low-volume flush water closets, 3 gallons or less, and self-closing faucet valves. Showers shall have valves with pressure balance feature. Utilize freezeless wall hydrant. Provide interior wall access (self draining) with hose attached. Wall mounted drinking fountains are preferred.
- All applications of plumbing fixtures shall be considered for handicapped usage as directed by Air Force Guidelines.

The following table suggests plumbing fixture types for the three zones. The codes below describe different types of each fixture and identify which zones are appropriate.

1. *Water closets*- Flushometer valve, siphon-jet, elongated bowl, top supply spud, floor or wall mounted. Seat: Plastic, elongated, open front
2. *Water closets (handicapped)* - Top rim of bowl shall be 18" above the floor. (All others same as #1)

- 3. *Water closet* - Siphon-jet, elongated bowl, flush tank, floor mounted. Seat: Plastic, elongated, open front with seat cover.
- 4. *Lavatories* - Enameled cast iron or vitreous china. Faucet: as required.
- 5. *Lavatories* - Enameled cast iron or vitreous china, counter top. Faucet: as required.
- 6. *Wheelchair sinks* - Vitreous china, 20 inches by 27 inches deep.
- 7. *Urinal* - wall hung. Siphon-jet or washout.
- 8. *Kitchen sinks* - Single or double bowl, ledge back with holes for faucet and spout, stainless steel. Faucet - as required.
- 9. *Service Sinks* - Enameled cast iron. Trap standard, wall mounted or floor mounted. Faucet - as required.
- 10. *Food Service Sinks* - Stainless steel with drain board. Faucet - as required.
- 11. *Water Coolers* - Self contained. Exposed surfaces shall be stainless steel. Wall mounted surface. Wall mounted semi-recessed. Wall mounted recessed. Handicapped. Free standing.
- 12. *Showers* - Wall mounted for stall or bath tub. Valves - as required.
- 13. *Bathtubs* - Straight front recessed. Enameled cast iron, porcelain enameled. Formed steel, plastic without wall, plastic with high wall.

Fixtures	Zone 1: Industrial / Mission	Zone 2: Community / Administration	Zone 3: Military / Family Housing
A. Water Closets	1,2	1,2	3
B. Lavatories	4	4	5
C. Urinals	7	7	
D. Sinks (Kitchen)		8	8
E. Sinks (Service)	9	9	
F. Sinks (Food Service)	10	10	
G. Sinks (Medical)	6	6	6
H. Water Coolers	11	11	
I. Showers	12	12	12
J. Bath Tubes		13	13

4. HEATING

4.A Current Conditions

Heating throughout the base, at present, is accomplished with gas fired furnaces, gas fired boilers or electric heat pump systems. The transfer medium is either hot air or hot water. Presently there is equipment outside or on buildings which does not enhance the appearance of the structure.

4.B General Recommendations

- The use of cast iron boilers is discouraged. Provide boiler water testing sample points on all hot water systems. Provide chemical feeding systems on all hot water heating systems. Provide automatic pilotless ignition systems on all gas fired equipment. Install thermostats on heating supply and return lines. Install pressure gauges with valves on suction and discharge lines to all pumps. Install gas pressure gauges with valves on all gas trains on boilers.
- Controls shall be Staefa or Barber Coleman.
- Access to equipment for servicing is the single most important item for designing of new systems. Coils, filters, valves, pumps or tube removal or servicing is to be considered when Designing mechanical systems.
- No VAV Systems shall be allowed on Base.
- Sloped roofs shall not have any equipment located on them. All equipment located closer than 10 feet, 0 inches from the edge of a flat roof shall have a safety railing.

- Equipment located on the ground shall be hidden from view.
- Where humidification is required, steam humidifiers shall be used.
- Solar heating systems are to be considered when the base indicates that budgeting conditions are favorable for studying.
- Design Conditions shall be as follows:

Latitude	32° 51'
Longitude	106° 06'
Elevation	4093 feet
Winter Design @ 97.5%	19°F outside 70°F inside
Heating Degree Days	3223
- The fuels available for use are gas for furnaces and boilers, electric for heat pumps, and solar if the basic Scope will allow.
- The equipment selection should be based on the system selected to provide the most energy efficient combination.
- Equipment types to be used:
 - Type-1 Boilers shall be steel water tube or fire tube.
 - Type-2 Heat exchanges shall be shell and tube type or plate type.
 - Type-3 Heat pumps shall be air-to-air, water-to-air or geothermal closed loop.
 - Type-4 Circulating pumps shall be centrifugal base mounted, inline horizontal or vertical.

- Type-5 Unit heaters shall be horizontal or vertical.
- Type-6 Air handling units shall be blow thru or draw thru packaged type.
- Type-7 Fan coil units shall be horizontal, vertical or thru the wall type.
- Type-8 Radiant heaters shall be gas fired.
- Applicable Equipment Types:
Zone-1 Type-1,2,4,5,6 and 8.
Zone-2 Type-1,2,3,4,6 and 7.
Zone-3 Type-1,3,4,7 and 9.
- *Controls:* New and modifications to existing facilities will be designed to be compatible with the existing EMCS System. Temperature controls will be used to fullest extent consistent with economy of operation. They will be adequately protected against unauthorized adjustments or tampering (locking covers). Heating systems shall be provided with a control for positive cut-off above 65°F outside temperature.

5. AIR CONDITIONING

5.A Current Conditions

Mechanical refrigeration is presently used in general for living quarters, office buildings, dining halls and clubs, hospitals and clinics, and shop areas with equipment requiring a controlled environment. There is no central heating or cooling system on the Base.

5.B General Recommendations

- The use of cooling towers should be avoided. Evaporative coolers shall be installed at the 2 to 3 foot level, not on the roof. All condensing units shall be air cooled. Select air cooled condensers based on 105°F ambient. Avoid the use of centrifugal chillers. A central mechanical system shall normally be provided unless specific engineering cost analysis indicate sub systems to be more economical. Locate equipment designed to operate outside behind architectural screening. Avoid locating outside equipment near the main entry of buildings.
- Controls shall be Staefa or Barber Coleman.
- Access to equipment for servicing is the single most important item for designing of new systems. Coils, filters, valves, pumps or tube removal or servicing is to be considered when designing mechanical systems.
- No VAV Systems shall be allowed on Base.
- Sloped roofs shall not have any equipment located on them. All equipment located closer than 10 feet, 0 inches from the edge of a flat roof shall have a safety railing.

- Equipment located on the ground shall be hidden from view.
- Design Conditions shall be as follows:

Latitude	32° 51'
Longitude	106° 06'
Elevation	4093 feet
Summer Design	96°F DB68°F WB Outside
	78°F DB50% RH Inside
Mean Daily Range	28°F.
- Solar heat gain calculations shall be prepared for all building construction projects at Holloman AFB.
- *Fuel:* Mechanical refrigeration shall be fueled by electricity.
- *Equipment:* shall be suitable for the application.

Type-1: Chillers shall be packaged air cooled type.

Type-2: Evaporative coolers shall be up-blast or vertical discharge closed circuit type or cellulose material impregnated with antirot salt and rigidifying saturants. Media efficiency shall be 76% at 600 FPM face velocity with no entrainment of pad water. Open evaporative coolers shall be designed to provide an indoor temperature of 80°F.

Type-3: Heatpumps shall be air-to-air, water-to-air or geothermal closed loop.

Type-4: Circulating pumps shall be centrifugal base mounted, inline horizontal or vertical.

Type-5: Air handling units shall be blow thru or draw thru packaged type.

Type-6: Fan coil units shall be horizontal, vertical or thru the wall type.

- Applicable Equipment Types
 - Zone-1: Type-1,2,4,5 and 6.
 - Zone-2: Type-1,2,3,4,5 and 6.
 - Zone-3: Type 3 and 6.
- *Controls:* New and modifications to existing facilities will be designed to be compatible with the existing EMCS System. Temperature controls will be used to fullest extent consistent with economy of operation.

6. ENERGY

Insulate all fluid conveying piping. Insulate all duct work carrying conditioned air through unconditioned spaces. Recover heat from exhaust air if cost efficient. Minimum SEER = 12.0 for residential only, minimum COP - 2.5.

7. FIRE PROTECTION

7.A Current Conditions

Most buildings on base have some type of fire protection system. The type depends on the level of protection needed and the environment the system is to operate in.

7.B General Recommendations

- All buildings shall be equipped with an antenna to provide interface with the base fire alarm system MONACO BT2-3. All cabling shall be in conduit, whether exposed or concealed.
- *Design Conditions:* All fire protection design shall be per NFPA 13, NFPA 13R, Life Safety Code and Military Handbook 1008B.
- *Distribution:* The underground piping systems shall be PVC. Aboveground piping systems shall be Schedule 40 steel threaded or welded. Schedule 80 copper with high temperature solder and Schedule 10 steel can also be used above ground.
- *Alarm Systems:* All buildings shall be monitored for fire signals back to the Base Fire Stations.
- For dormitories 3 stories or higher all areas must be sprinkled and the sprinkler system must be connected with the existing base alarm system. Dormitories shall have dual detection systems, heat/smoke in sleeping room with a local room alert.
- Provide reduced pressure backflow preventors on all service entrances.

8. UNDERGROUND ELECTRICAL

8.A Current Conditions

There are three (3) existing primary substations with a total of 55 MVA and with a potential of 85 MVA. The primary voltage is 13.2/7.6 KV. The secondary is 480/277V or 208/120V and in some cases 240V.

8.B General Recommendations

- Because of the corrosive soil conditions, underground electrical distribution shall be 6-way PVC duct encased in concrete. Provide one (1) spare conduit. Use "stirrup" connectors to connect service feeders to overhead conductors.
- *Design Conditions:* The design of underground distribution systems shall be based on the calculated demand with sufficient electrical capacity for expansion if allowed or if within the budget.
- *Materials:* The materials as indicated above shall be plastic conduit encased in concrete allowable plastic conduits include PVC, fiberglass or similar nonmetallic electrical duct.

Underground distribution shall have junction boxes with load breaks, not manholes.

9. ABOVEGROUND ELECTRICAL

9.A General Recommendations

- *Overhead Transmission and Distribution Lines:* There currently exists, in some areas of the base, overhead transmission and distribution lines. Future overhead electrical distribution shall be kept to a minimum.

If used, the poles for this system of distribution shall be sized to handle the application and shall be wood pressure treated with creosote. Concrete poles shall be reinforced or prestressed either cast or spun.

Crossarms for wood poles shall be solid wood, distribution type and shall be sized for the intended load.

Underbuilt services such as low voltage distribution or communications distribution running on the same pole system shall be installed per N.E.C.

Vertical phases for directional changes of the aerial distribution shall be consistent with the base standard and per N.E.C.

Lighting protection for aerial distribution shall be through the use of a combination static and neutral wire.

- *Motors:* All motors of 5 HP or larger shall have single phasing protection of the type that trips when the phase angle between the three phases is not 120 degrees or on an undervoltage condition. All motors of 50 HP or larger shall utilize soft start type.

- *Site Lighting:* Site lighting shall continue to exhibit continuity throughout the Base. See Landscape Design Standards, Section 12, for lighting fixture standards.

- *Grounding:* Provide separate grounding conductors and rods for surge (lightning) arrestors and service neutrals. Provide insulated grounding conductors to all grounding type outlets. Metallic conduit shall not constitute a safety ground. Include in specifications: Use three-point ground test and instrumentation. Perform test in presence of the government inspector. Submit results and indicate type of test performed.

- *Transformers:* Provide service transformers with delta primary and wye secondary connections for three phase services. All service transformers shall have two 2-1.2% taps above and below rated voltage. Provide low %Z transformers where short circuit currents permit. Screen all exterior transformers from major circulation routes or common areas.

- *Panel Boards:* Provide typed panel schedules. Provide manual bypass for all auto transfer generator panels.

- Emergency lighting in shops and offices shall be ceiling mounted no wall packs or bug eyes.

10. INTERIOR LIGHTING

10.A General Recommendations

- Provide wire guards for all open fluorescent lamps. Utilize energy saver 32 watt T-8 fluorescent lamps and electronic ballasts in administrative and similar areas. Use high pressure sodium lights in bay areas where color rendition is not vital. Provide seismic zone 2 protection for all fixtures, especially ceiling grid mounted fluorescent fixtures. Provide Certified Ballast Manufacturer (CBM) listed ballasts. All ballasts shall be electronic and shall have 0.90 power factor or greater and with a total harmonic distribution of < 10%.

10.B Approved Products / Materials

- *Wiring Devices:* Provide new devices and plates whenever an area is renovated. All devices shall be recessed except in mechanical rooms and utility areas. Provide devices rated at 20 amps or greater where heavy use or electrical load dictates the need for 20 amp or greater devices. All wiring shall be copper. No aluminum allowed.
- *Automatic Controllers:* Provide battery backup for lawn sprinkler system controllers and automatic setback thermostats.
- *Overcurrent Protective Devices:* The minimum sized overcurrent device for branch circuits is 20 amps. Ensure proper coordination and withstand ratings for all overcurrent protection devices. Demonstrate coordination with first upstream existing protective device. Replace old circuit breakers with new when remodeling facilities. If replacement breakers are unavailable, consider replacement of entire panel

board. Main fusing is acceptable for limiting short circuit currents; however, place a box with one full set of spare fuses adjacent to main panel.

- *Electrical Identification:* Provide plastic panel board and disconnect labels. Labels shall be laminated (black with white core) engraved with 1/4" high letters. Attach to front exterior of enclosures. Labels shall match plan designations. Provide non-ferrous phase and circuit identification labels in all enclosures for feeder circuit conductors. Provide underground marker tapes for all underground conductors. If underground conductors are not in metallic conduit, provide marker tape with foiled backing to facilitate detection.
- *Power Factor Correction:* Add power factor (p.f.) capacitors to induction motors (10 HP or larger) to correct p.f. to 0.90 (+.05, -.00). Switch p.f. capacitors in with the motor. Size capacitor IAW IEEE 141, NEMA MG2 and motor manufacturer recommendations.
- *Power Service:* Power requirements for buildings shall be 208/120 except 480/277 based on building function as an exception.
- *Electrical Related Work:* Balance loads on phases within 10% at all panel boards. Conduit fault calculations to ensure proper withstand ratings for all protective devices. Ensure coordination for all protection devices, conductors, enclosures and equipment.
- *Raceways:* Conduit run in concrete shall be PVC unless steel conduit is needed for a specific reason, i.e. to limit fault currents. Underground primary voltage feeders shall be in concrete encased conduit.

All penetrations of fire resistance rated walls shall be fire stopped IAW NEC Article 300-21. Highlight compliance with NEC Articles 300-5(g) and 300-7(1) regarding moisture seals.

- *Conductors:* Aluminum conductors smaller than No. 4 AWG may not be used. In mission critical facilities housing, dormitories, and transient quarters, aluminum conductors may only be used for service entrances. The smallest branch circuit conductors acceptable are No. 12 AWG. Conductors No. 6 AWG and larger shall have heat resistant insulation.
- *Conduits:* All new utility lines shall be run in underground conduit, provide spare conduits from transformer to building.
- *Meters:* Meters shall be generally located in rear of building or near service entrance.
- All new buildings shall have lightning protection designed into the project.

11. SECURITY SYSTEMS

11.A General Recommendations

- In order to maintain coordinated system growth, security panels shall be compatible with the Base system.
- Install a 3/4-inch conduit from the security panel to the building's main telephone backboard (home run panel). Install a 24 AWG four wire Cat 5 telephone cable in this conduit
- Security panels will have a minimum of sixteen programmable zones. Door contacts will be grouped together with a maximum of five door contacts per zone. Motion detectors will be grouped together with a maximum of five motion detectors per zone. Under the floor or above the ceiling motion detectors or other sensors will be zoned separately. Duress alarm sensors and duct detectors will also be zones separately. Sensors on each zone are to be wired in series.
- Install a separate power supply in a junction box adjacent to the security panel to power all motion detectors or other non passive field security sensors. Install conduit between the power supply junction box and the security panel. Provide 115V AC to an AC handy box inside the power supply security panel. Install a 115V AC receptacle with an ON/OFF switch in the handy box. This receptacle will be used to plug in the stepdown transformer that powers the security panel.
- Magnetic card readers with keypads shall be installed to permit entry into a secure area. Mycraft Technologies card reader ASC/1150 is supported by our system. The keypad shall be mounted on the outside of the primary entrance into the classified area. If the keypad is mounted on an external wall exposed to the elements, a NEMA enclosure with hinged cover will be installed to protect the card reader. The enclosure will be of sufficient size to allow the user to swipe the card through the reader.
- The Civil Engineering EMCS Shop will perform all software programming necessary for the central computer to communicate with security panels.

12. TELECOMMUNICATIONS

12.A General Recommendations

This section describes telephone, rewiring, computer support, and other communication requirements which must be addressed in the project design. These criteria are as follows:

- New construction and remodeling projects should make provisions for conduit, outlets, lockable enclosures, power and building entrance. Locate telecommunication rooms close by electrical equipment rooms.
- *Telephone Systems* - Provide 3/4" x 4' x 8' plywood backboard in the mechanical room. Provide 120V duplex receptacle adjacent to board with a #6 AWG bare copper wire from backboard to grounding bar in panel board. Provide conduit to exterior for telephone service drop - prefer below ground access.
- *Pay Phones* - Ensure that electrical power is provided next to all pay phones.
- *Wiring and Conduit (General)* - Provide prewired outlets with covers for phones and computer. All cable and phone lines prewired back to a central electrical space in the building. Provide empty underground conduit to exterior manhole for both cable and phone.
- *Electrical Room* - All telecommunications and electrical rooms shall be environmentally controlled.
- Communication wiring shall be located in cable trays above ceilings.

- All new buildings shall be pre-wired for telecommunication in conduit which include fire alarm, telephone and EMCS Systems.
- *LAN System*: Category 5, 10 Base T cable. Use dual wall plates, 1 phone and 1 LAN.

13. CORROSION CONTROL

13.A General Recommendations

When metal is in contact with water, either above or below ground sacrificial anodes and impressed current systems shall be used; provide test stations and all rectifiers shall be standardized.

